

Mobiles

Q1.

Wireless Networks becoming increasingly popular.

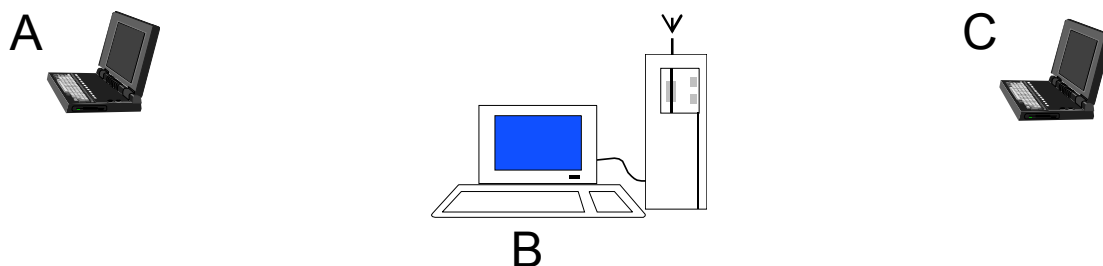
- a. List the four main applications for wireless LANs.

Solution:

- **Cross Building Interconnections:** interconnects nearby buildings
- **Nomadic Access:** provides wireless link between a LAN hub and mobile data terminals equipped with an antenna.
- **LAN extension:** saves cost of cabling installation and ease of installation where cabling is difficult.
- **Ad-hoc network:** allowing peer-to-peer network (no centralised server) set-up temporarily to meet some intermediate needs.

- b. Explain the 'hidden node' problem in an IEEE802.11 networks and how it is overcome.

Solution:



In the above diagram, both A and C can see B. But neither A nor C can see each others signal. Suppose A begins to transmit to B, node C cannot see the transmission in progress. If C starts a transmission during this time, there will be a collision and both packets will be lost. To overcome this problem, A sends 'RTS – Request to Send' to B. In response, B sends a 'CTS – Clear to Send' message stating that A is clear to send. This CTS packet from B is seen by both C and A so A now knows to start transmission and C knows to keep quiet.

Q2.

The IEEE802.11 Distributed Infrastructure System comprises of two services, BSS and ESS. Explain the functionality of these two services.

Solution:

BSS: Basic Service Set – consists of several stations executing the same MAC protocol and competing for access to the same wireless medium. The BSS may be isolated or connected to a distributed backbone system (DS) through an access point (AP). The DS can be a switch, a wired network or wireless network.

ESS: Extended Service Set – consist two or more BSS, interconnected to an AP. Typically, the DS is a wired backbone LAN.

Q3.

GSM uses the frequency band 890-915 MHz for Mobile to Base and 935-960 MHz for Base to Mobile. Each radio Channel has 200 kHz bandwidth.

(i) What is the total number of available 2-way radio channels?

Solution:

$$\text{Bandwidth} = 915 - 890 \text{ MHz} = 25 \text{ MHz}$$

$$\text{Total Radio Channels} = \frac{25 \times 10^6}{200 \times 10^3} = 125 \text{ Channels}$$

This is the principle of FDMA (Frequency Division Multiple Access)

(ii) Each radio channel is divided into 8 time slots. What is the total number of mobile calls that can be simultaneously serviced?

Solution:

$$\text{Total Number of Mobile Calls} = 125 \times 8 = 1000 \text{ calls}$$

Each of the time slots of a radio channel carries a different mobile call. This is the principle of TDMA (Time Division Multiple Access).